



1. English translation of claims of Komai on page (2), line 1 to page (3), line 12 in Japanese publication

[Claims]

[Claim 1] A method for manufacturing a surface-treated steel sheet comprising the step of:

subjecting a steel sheet to immersion treatment or electrolytic treatment in an acidic surface treatment solution containing at least one selected from the group consisting of tetravalent V compounds and a pH adjusting agent.

[Claim 2] The method for manufacturing a surface-treated steel sheet comprising the step of:

subjecting a steel sheet to immersion treatment or electrolytic treatment in an acidic surface treatment solution containing at least one selected from the group consisting of tetravalent V compounds, at least one selected from the group consisting of Mo compounds, Ti compounds and Zr compounds, and a pH adjusting agent.

[Claim 3] The method for manufacturing a surface-treated steel sheet comprising the steps of:

subjecting a steel sheet to immersion treatment or electrolytic treatment in an acidic surface treatment solution containing at least one selected from the group consisting of tetravalent V compounds and a pH adjusting agent, and

subjecting subsequently the steel sheet further to

inorganic treatment or organic treatment.

[Claim 4] The method for manufacturing a surface-treated steel sheet comprising the steps of:

subjecting a steel sheet to immersion treatment or electrolytic treatment in an acidic surface treatment solution containing at least one selected from the group consisting of tetravalent V compounds, at least one selected from the group consisting of Mo compounds, Ti compounds and Zr compounds, and a pH adjusting agent, and

subjecting subsequently the steel sheet further to inorganic treatment or organic treatment.

[Claim 5] The method for manufacturing a surface-treated steel sheet according to any one of claims 1 to 4, wherein pH of the surface treatment solution is 1 to 6.

[Claim 6] The method for manufacturing a surface-treated steel sheet according to any one of claims 1 to 4, wherein the tetravalent V compounds are at least one selected from the group consisting of vanadium fluoride, vanadium chloride, vanadium oxide and vanadium sulfate oxide.

[Claim 7] The method for manufacturing a surface-treated steel sheet according to any one of claims 1 to 4, wherein the pH adjusting agent is at least one selected from the group consisting of phosphoric acid, phosphate, polyphosphate and biphosphate.

[Claim 8] A surface-treated steel sheet coated with a surface coating film containing, as a main component, an oxide or a hydroxide of tetravalent V and at least one selected from the group consisting of P, Mo, Ti or Zr.

[Claim 9] The surface-treated steel sheet coated with a surface coating film containing, as a main component, an oxide or a hydroxide of tetravalent V and at least one selected from the group consisting of P, Mo, Ti or Zr, and further coated on the surface-treated steel sheet with an inorganic treatment film or an organic treatment film.

[Claim 10] The surface-treated steel sheet according to claim 8 or 9, wherein the steel sheet is a cold-rolled steel sheet, a plated steel sheet which is plated with a metal of any one of Sn, Ni, Cu and Al, an alloy plated steel sheet which is plated with at least two of the metals or a multi-layer plated steel sheet wherein the multi-layer includes at least two of the metals.

[Claim 11] The surface-treated steel sheet according to claim 8 or 9, wherein the steel sheet is a Zn-plated steel sheet, a Zn-containing alloy plated steel sheet or a Zn-containing composite plated steel sheet.

[Claim 12] A resin film coated steel sheet according to any one of claims 9 to 11, wherein the thickness of the inorganic treatment film or the organic treatment film is 0.1 to 5 μ

m.

[Claim 13] The resin film coated steel sheet, wherein the surface-treated steel sheet according to any one of claims 8 to 12 is coated thereon with an organic resin.

【特許請求の範囲】

【請求項1】 4価のV化合物の1種以上と、pH調整剤とを含有する酸性の表面処理液中で鋼板を浸漬処理あるいは電解処理することを特徴とする、表面処理鋼板の製造方法。

【請求項2】 4価のV化合物の1種以上と、Mo化合物、Ti化合物、Zr化合物のいずれか1種以上と、pH調整剤とを含有する酸性の表面処理液中で鋼板を浸漬処理あるいは電解処理することを特徴とする、表面処理鋼板の製造方法。

【請求項3】 4価のV化合物の1種以上と、pH調整剤とを含有する酸性の表面処理液中で鋼板を浸漬処理あるいは電解処理した後、さらに無機処理または有機処理を施すことを特徴とする、表面処理鋼板の製造方法。

【請求項4】 4価のV化合物の1種以上と、Mo化合物、Ti化合物、Zr化合物のいずれか1種以上と、pH調整剤とを含有する酸性の表面処理液中で鋼板を浸漬処理あるいは電解処理した後、さらに無機処理または有機処理を施すことを特徴とする、表面処理鋼板の製造方法。

【請求項5】 前記表面処理液のpHが1～6であることを特徴とする、請求項1～4のいずれかに記載の表面処理鋼板の製造方法。

【請求項6】 前記4価のV化合物が、フッ化バナジウム、塩化バナジウム、酸化バナジウム、酸化硫酸バナジウムのいずれか1種以上であることを特徴とする、請求項1～4のいずれかに記載の表面処理鋼板の製造方法。

【請求項7】 前記pH調整剤が、リン酸、リン酸塩、ポリリン酸塩、重リン酸塩のいずれか1種以上であることを特徴とする、請求項1～4のいずれかに記載の表面処理鋼板の製造方法。

【請求項8】 鋼板上に、Vの4価の酸化物または水酸化物と、P、Mo、Ti、またはZrの1種以上を含有する物質を主成分とする表面処理皮膜を被覆してなる表面処理鋼板。

【請求項9】 鋼板上に、Vの4価の酸化物または水酸化物と、P、Mo、Ti、またはZrの1種以上を含有する物質を主成分とする表面処理皮膜と、さらにその上層に無機処理皮膜または有機処理皮膜とを被覆してなる表面処理鋼板。

【請求項10】 前記鋼板が、冷延鋼板であるか、Sn、Ni、Cu、Alのい

ずれかの金属 1 種をめっきしためっき鋼板であるか、前記いずれかの金属 2 種以上からなる合金をめっきした合金めっき鋼板であるか、あるいは前記金属 2 種以上を含有する複層めっきを施した複層めっき鋼板である、請求項 8 又は 9 に記載の表面処理鋼板。

【請求項 11】 前記鋼板が、Zn めっき鋼板であるか、Zn を含む合金めっき鋼板であるか、あるいは Zn を含む複合めっき鋼板である、請求項 8 又は 9 に記載の表面処理鋼板。

【請求項 12】 前記無機処理皮膜または有機処理皮膜の厚みが $0.1 \sim 5 \mu\text{m}$ であることを特徴とする、請求項 9 ～ 11 のいずれかに記載の樹脂被覆表面処理鋼板。

【請求項 13】 請求項 8 ～ 12 のいずれかに記載の表面処理鋼板の上層に有機樹脂を被覆してなる樹脂被覆表面処理鋼板。